

Rev.	ECO	Description	Checked	Approval	Date
01	32-149	Release	M. Smith		

**CRaTER**  
**EU Mock-up Mechanical Low Level sine**  
**Sweep procedure**

Dwg. No. 32-06004.01

Revision 01  
 6/22/06



# 1. Introduction

## 1.1. Activity Description

This activity mechanically tests the frequencies of the Crater Engineering Mock-up Assembly.

## 1.2. Test Item Description

The Unit Under Test is the engineering unit housing, 32-20203 with the engineering top and bottom covers, 32-20204, 32-20205, a bare engineer digital PCB 32-20202, with the actell and TO can mounted, a mock Analog PCB, supplied by Aerospace with two connectors mounted at J1 and J2, and the mock telescope assembly supplied by Aerospace.

NOTE: The E-box housing is made form Aluminum 7075-T651, all other aluminum parts are 6061-T6.

The overall weight of the assembly is 9.2 lbs, excluding weight of the accelerometers.

## 1.3. Support Item Description

None Required

## 1.4. Applicable Documents

<u>Document</u>	<u>Title</u>
None	

## 1.5. Reference Documents

<u>Document</u>	<u>Title</u>
None	

## **2. Requirements**

### **2.1. Low Level Resonance search**

This test is to determine the natural frequencies of the assembly. Low level resonance search shall be at 1/2g. Duration is 60 seconds.

### **2.2. Repeat Low Level Resonance Search**

This test is to verify the natural frequencies of the assembly. Low level resonance search shall be at 1/2g Duration is 60 seconds

### **2.3. List of Required Items**

- EU Crater Assembly with top and bottom covers removed
- Shake fixture
- 6 Accelerometers, single axis, Endevco model \_\_\_\_\_.
- 3 Triax accelerometers. Endevco model number \_\_\_\_\_
- Toque tools, in oz, in-lbs
- Alcohol
- Wipes
- 2-56 x 3/16 screws and #2 FW, qty 50
- #4-40 x 5/16 screws and washers, qty 50
- #10-32 SHCS x 5/8" and Heavy #10 FW, qty 8.

### **2.4. Safety**

All personnel involved in testing/operations shall have reviewed this procedure prior to beginning testing and will understand what hazards may be encountered during testing.

When unsafe conditions exist, the test conductor shall take whatever actions necessary to prevent injury to personnel and/ or equipment.

## **2.5. Data**

The following shall be included as part of the CRaTER Acceptance Vibration Test Data Package:

- 2.5.1. Control and response accelerometer PSD plots for all resonance searches.
- 2.5.2. The as run filled in copy of this procedure.

## **3. Facilities and Configuration**

### **3.1. Facility**

The Facility and shaker used for this test is provided by Charles Stark Draper Labs, Cambridge MA.

### **3.2. Test Configuration**

The CRaTER Assembly is configured for test is attached to the vibration test fixture at the mounting flange by a total of six (6) bolts, #10-32UNC x 5/8 High Strength, and six (6) washers. The control accelerometers are attached to the vibration fixture.

## **4. Procedures**

Space is provided for recording information of particular significance pertaining to this test by the test conductor. In addition, the test conductor may red line the procedure to more accurately document the actual flow of events, both routine and anomalous. The following pages plus the facility data will be attached to the test report filed at the conclusion of these activities. The order of test axes is not significant. The order of the testing within each axis should be as specified.

### **4.1. Test Anomaly**

Deviation from any expected result or observation of any anomalous behavior of the test article during vibration testing shall require the testing to be stopped and noted in the test log. The test conductor will determine the proper course of action to be taken and when to continue with the remainder of the test procedure.

## 4.2. Identification

### 4.2.1. Equipment

Table 8. Accelerometer identification.

Description	Acc Model number	accel S/N	Calibration Date
1. Telescope @1			
2. Telescope @2			
3. E-box @3			
4. E-box @4			
5. Top Cover			
6. Analog Board			
7. Digital Board			
8. Bottom Cover			

### 4.2.2. Personnel

Table 9. Personnel

Test conductor	

## 4.3. Expected frequencies

Frequency	Location

#### 4.4. X Axis Acceptance Test

##### 4.4.1. Preparation

Attach shake plate to shaker head.

Install Accelerometers at positions 6, 7, and 8. Install acc cables and test accelerometers.

After verifying that the accels and cables are ok at these 3 locations, mount and secure top and bottom covers using #2-56 by 3/16 screws. Torque to 54 in-oz.

torque	Date	Initial

Mount Crater assembly to shake table in X Direction:

First mount screw at the 0,0,0 location due to hardware interference with the housing.

Torque #10-32 screws to 35 in-lbs.

Install accelerometers 1 thru 5. Document serial numbers above.

Orientate the accels in the proper orientation.

Connect accel cables and verify function.

	Date	Initial

Table 8. Accelerometer identification.

Description	Acc Model number	accel S/N	Calibration Date
1. Telescope @1			
2. Telescope @2			
3. E-box @3			
4. E-box @4			
5. Top Cover			
6. Analog Board			
7. Digital Board			
8. Bottom Cover			

4.4.2. Low level Resonance Search, X Axis.

Perform Low Level Resonance vibration sine sweep at 1/2g for a minimum of 60 seconds.

Frequency	Response	Date	Initial

4.4.3. Repeat Low level Resonance Search, X Axis,

Perform Low Level Resonance sine sweep at 1/2g for a minimum of 60 seconds

Axis	Frequency	Response	Date	Time	Initial

4.4.4. Resonance Comparison, X Axis,

Compare the results of the 2 tests for differences in recorded resonances.

Differences	Date	Time	Initial

#### 4.4.5. Post X axis Inspection

	Date	Initial

#### 4.5. Y Axis Acceptance Test

Table 8. Accelerometer identification.

Description	Acc Model number	accel S/N	Calibration Date
1. Telescope @1			
2. Telescope @2			
3. E-box @3			
4. E-box @4			
5. Top Cover			
6. Analog Board			
7. Digital Board			
8. Bottom Cover			

##### 4.5.1. Low level Resonance Search, Y- Axis

Perform a low level sine sweep at 1/2g for a minimum of 60 seconds.

##### Y Axis Low level Resonance search

Frequency	Response	Date	Initial



**4.5.2. Repeat Low level Resonance Search Y- Axis,**

Perform a low level sine sweep at 1/2g for a minimum of 60 seconds..

Frequency	Response	Date	Initial

**4.5.3. Resonance Comparison, Y- Axis,**

Compare the results for differences in recorded resonances.

Differences	Date	Time	Initial

**4.5.4. Post Y axis Inspection**

Inspect	Date	Time	Initial

**4.6. Z axis Test**

**4.6.1. Preparation**

Remove and reattach Sensor Base Assembly for Z axis vibration testing.  
Torque 10-32 x 5/8" long (NAS 1352C10-10) screws with washers to 35 in lbs.  
Attach accelerometer cables to the facility recording equipment.

Date	Initial

4.6.2. Low level Resonance Search, Z-Axis,

Perform a low level sine sweep at 1/2g for a minimum of 60 seconds.

Frequency	Response	Date	Time	Initial

4.6.3. Repeat Low level Resonance Search, Z-Axis

Perform a low level sine sweep at 1/2g for a minimum of 60 seconds..

Axis	Frequency	Response	Date	Time	Initial

4.6.4. Resonance Comparison Z-Axis,

Compare the results for differences in recorded resonances.

Differences	Date	Time	Initial

**4.7. Removal CRaTER Assembly From Shaker fixture**

Remove the accelerometer cables from the facility recording devices. Disconnect the CRaTER Assembly from the vibration plate. Remove top and bottom covers to remove the remaining accelerometers.

**4.8. Post Vibration Inspection**

**4.8.1. External**

Visually inspect the exterior of the Sensor Base Assembly for structural damage, backed out screws or other anomalies.

location	Date	Initial

**4.8.2. Internal**

Visually inspect the exterior of the CRaTER Assembly for structural damage, backed out screws or other anomalies.

inspections	Date	Initial

4.8.3. Weigh assembly.

Weight		
Triax accelerometer		
Single accelerometer		
As tested CRATER Assembly. Include covers, Digital and Analog mock ups, Telescope.		
After disassembly weigh individual items  Telescope E-box Digital board Analog board Dc/dc converter(Mock) Emi Filter(mock) Top cover Bottom Cover		